INDIANA DEPARTMENT OF TRANSPORTATION
MATERIALS AND TESTS DIVISION

SCRATCH HARDNESS OF COARSE AGGREGATE PARTICLES
ITM No. 206-01T

1.0 SCOPE.

1.1 This test method covers determining the quantity of soft particles in coarse aggregates on the basis of scratch hardness.

1.2 The values stated in either acceptable English or SI metric units are to be regarded separately as standard, as appropriate for a specification with which this ITM is used. Within the text, SI metric units are shown in parenthesis. The values stated in each system may not be exact equivalents; therefore each system shall be used independently of the other, without combining values in any way.

1.3 This ITM may involve hazardous materials, operations, and equipment. This ITM does not purport to address all of the safety problems associated with the ITM's use. The ITM user's responsibility is to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2.0 REFERENCES.

2.1 AASHTO Standards.

T 27	Sieve Analysis of Fine and Coarse Aggregates
M 92	Wire-Cloth Sieves for Testing Purposes
M 231	Weighing Devices Used in the Testing of Materials

2.2 ITM Standards.

207	Procedures for Sampling Stockpiled Aggregates

3.0 SIGNIFICANCE AND USE.

3.1 This ITM is used to identify materials that are soft, including those which are so poorly bonded that the separate particles in the piece are easily detached from the mass The test is not intended to identify other types of deleterious materials in aggregates.

3.2 In case of questions, the scratch hardness test should be made on a freshly broken surface of the aggregate particle. If the particle contains more than one type of rock and is partly hard and partly soft, it should be classified as soft only if the soft portion is one third or more of the volume of the particle. Scratch hardness tests may be made on the exposed surface of a particle provided consideration is given to softening of the surface due to weathering. A particle with a thin, soft and weathered surface and a hard core should normally be classed as soft.

4.0 APPARATUS.

4.1 Sieves, conforming to the requirements of AASHTO M 92.

4.2 Balance, a Class G2, conforming to the requirements of AASHTO M 231.

4.3 Pans, as needed.

4.4 Brass Rod, 1/16 in. (1.6 mm) in diameter, with a rounded point, mounted in a device so that a load of 2 ± 0.1 lbf (8.9 ± 0.4 N) is applied to the specimen tested. The brass rod shall be of suitable hardness so that when filed to a sharp point, it will scratch a U.S. Lincoln design copper penny but fail to scratch a U.S. Jefferson design nickel.

5.0 SAMPLES. Sampling shall be accomplished in accordance with ITM 207.

6.0 PREPARATION OF TEST SPECIMEN. Aggregate for the test shall consist of the material retained on the 3/8 in. (9.5 mm) and larger sieves following completion of AASHTO T 27.

7.0 PROCEDURE. Subject each particle of aggregate under test to a scratching motion of the brass rod, using a pressure of 2 lbf (8.9 N). Particles are considered to be soft if, during the scratching process, a groove is made in them without deposition of metal from the brass rod, or if separate particles are detached from the rock mass. In the case of some sandstones, brass fragments may be deposited on hard individual grains, while at the same time separate particles are detached from the mass due to a weak binding medium. Such particles are to be considered as soft.

8.0 CALCULATIONS. Particles determined to be soft are combined with structurally weak particles to determine the amount of non-durable material. The weight (mass) of non-durable material is calculated by:

$$\%\text{Non-durable} = \frac{\text{Weight (Mass) of Non-durable above 3/8 in. (9.5 mm) Sieve}}{\text{Weight (Mass) of Sample above the 3/8 in. (9.5 mm) Sieve}} \times 100$$

9.0 REPORT. Report the non-durable particles to the nearest 0.1%. A brief lithologic description of the soft particles shall also be included.